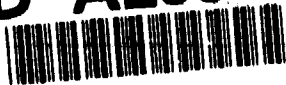


**AD-A253 810****PAGE**
**Form Approved**  
**OMB No 0704-0188**

... is estimated to average 1 hour per response, including the time for reviewing instructions, sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

<b>1. AGENCY USE ONLY (Leave blank)</b>		<b>2. REPORT DATE</b> 07/92		<b>3. REPORT TYPE AND DATES COVERED</b> POP Test (06/92)	
<b>4. TITLE AND SUBTITLE</b> Performance Oriented Packaging Testing of Container, Shipping and Storage, Mk 211 Mod 0 and Mk 567 Mod 0 for Packing Group II Solid Hazardous Materials				<b>5. FUNDING NUMBERS</b> <div style="text-align: center; font-size: 2em; font-weight: bold;"> DTIC  ELECTE  AUG 3 1992  S A D </div>	
<b>6. AUTHOR(S)</b> J. Mike Dwyer					
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> Naval Weapons Station Earle Test and Evaluation Branch (Code 5023) Colts Neck, NJ 07722-5000				<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b> DODPOPHM/USA/DOD/NADTR92014	
<b>9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> Commander, Naval Sea Systems Command (PMS-422) Department of the Navy Washington, DC 20362-5101				<b>10. SPONSORING/MONITORING AGENCY REPORT NUMBER</b> Same as above	
<b>11. SUPPLEMENTARY NOTES</b> N/A					
<b>12a. DISTRIBUTION/AVAILABILITY STATEMENT</b> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> This document has been approved for publication and sale; its distribution is unlimited. </div>				<b>12b. DISTRIBUTION CODE</b>	
<b>13. ABSTRACT (Maximum 200 words)</b>  This Performance Oriented Packaging (POP) test was conducted to ascertain whether the Mk 211 Mod 3 Shipping and Storage Container meets the Packing Group II requirements specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9 and the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 1 October 1991. The packaged commodity used for the test was a simulated inert warhead section weighing 65 kg (143 pounds). This represents the current maximum commodity weight. To compensate for future growth variations in product and/or packaging, 13 kg (28 pounds) were added. Gross weight of the loaded container was 118 kg (260 pounds). The test results indicate that the container has conformed to the POP requirements.  In addition, due to their similarities in design, size, and weight, this test is considered representative of qualification testing for the Mk 567 Mod 0 Shipping and Storage Containers as per the variation in Title 49 CFR 107, Sec. 178.601h.					
<b>14. SUBJECT TERMS</b> POP Test of Mk 211 Mod 3 and Mk 567 Mod 0 Shipping and Storage Container				<b>15. NUMBER OF PAGES</b> 7	
				<b>16. PRICE CODE</b>	
<b>17. SECURITY CLASSIFICATION OF REPORT</b> UNCLASSIFIED		<b>18. SECURITY CLASSIFICATION OF THIS PAGE</b> UL		<b>19. SECURITY CLASSIFICATION OF ABSTRACT</b> UL	
				<b>20. LIMITATION OF ABSTRACT</b> UL	

**DODPOPHM/USA/DOD/NADTR92014**

**PERFORMANCE ORIENTED PACKAGING TESTING  
OF  
CONTAINER, SHIPPING AND STORAGE,  
MK 211 MOD 0 AND MK 567 MOD 0  
FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS**

**DTIC QUALITY INSPECTED 8**

**Author:  
J. Mike Dwyer  
Mechanical Engineering Technician**

**Performing Activity:  
Naval Weapons Station Earle  
Colts Neck, New Jersey 07722-5000**

**July 1992**

**FINAL**

Accession For	
NTIS CRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification .....	
By .....	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	

**DISTRIBUTION UNLIMITED**

**92-20927**



**Sponsoring Organization:  
Naval Sea Systems Command (PMS-422)  
Department of the Navy  
Washington, DC 20362-5101**

**92 8 3**

**044**

## INTRODUCTION

This Performance Oriented Packaging (POP) test was performed to ascertain whether the Mk 211 Mod 3 Shipping and Storage Container (Packing Group II) meets the requirements specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9 and the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 1 October 1991. The packaged commodity used for the test was a simulated inert warhead section weighing 65 kg (143 pounds). This represents the current maximum commodity weight. To compensate for future growth variations in product and/or packaging, 13 kg (28 pounds) were added. Gross weight of the loaded container was 118 kg (260 pounds).

Due to unavailability only one container was used for testing. This is less than the number required by the regulations. Approval for this deviation has been granted by the Under Secretary of Defense, Memorandum for the Joint Logistics Commanders dated 22 February 1990.

In addition, due to their similarities in design, size, and weight, this test is considered representative of qualification testing for the Mk 567 Mod 0 Shipping and Storage Containers as per the variation in Title 49 CFR 107, Sec. 178.601h.

## TESTS PERFORMED

### 1. Base Level Vibration Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.608. The container was placed on a repetitive shock platform which has a vertical linear motion of 1-inch double amplitude. Movement of the container was restricted during vibration in all but the vertical direction. The frequency of the platform was increased until the container left the platform 1/16 of an inch at some instant during each cycle. Test time was 1 hour.

### 2. Stacking Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.606. The container was subjected to a force applied to its top surface equivalent to the total weight of identical packages stacked to a minimum height of 3 meters (including the test container). A weight of 354 kg (780 pounds) was stacked on the test container. The test was performed for 24 hours. The weight was then removed and the container examined.

### 3. Drop Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.603. Six drops were performed from a height of 1.2 meters (4 feet) in the following orientations (three drops for each orientation):

- a. Horizontally.
- b. Diagonally on the edge between the cover assembly and the top ring of the container.

## **PASS/FAIL**

### **1. Base Level Vibration Test**

The criteria for passing the base level vibration test is outlined in Title 49 CFR, Sec. 178.608(c): No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength.

### **2. Stacking Test**

The criteria for passing the stacking test is outlined in Title 49 CFR, Sec. 178.606(d): No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength, cause instability in stacks of packages, or cause damage to inner packagings likely to reduce safety in transportation.

### **3. Drop Test**

The criteria for passing the drop test is outlined in Title 49 CFR, Sec. 178.603(f): A package is considered to successfully pass the drop tests if for each sample tested, no rupture occurs which would permit spillage of loose explosive substances or articles from the outer packaging.

## **TEST RESULTS**

### **1. Base Level Vibration Test**

Satisfactory.

### **2. Stacking Test**

Satisfactory.

### **3. Drop Test**

Satisfactory.

## DISCUSSION

### 1. Base Level Vibration Test

The input vibration frequency was 3.5 Hz. Immediately after the vibration test was completed, the container was removed from the platform, turned on its side and inspected. No unfavorable distortion or deterioration was observed.

### 2. Stacking Test

The container was inspected after the 24-hour period was over. No unfavorable distortion or deterioration was observed.

### 3. Drop Test

After each drop, the container was inspected. The warhead was completely retained by the container.

## REFERENCE MATERIAL

A. United Nation's "Recommendation on the Transportation of Dangerous Goods," ST/SG/AC.10/1, Revision 6.

B. Code of Federal Regulations, Title 49 CFR, Parts 107-178.

C. Bureau of Explosives Tariff No. BOE 6000K Hazardous Materials Regulations of the Department of Transportation by Air, Rail, Highway, Water including Specifications for Shipping Containers.

## DISTRIBUTION LIST

Defense Technical Information Center (2 copies)  
ATTN: DTIC/FDA  
Bldg. 5, Cameron Station  
Alexandria, VA 22304-6145

Defense General Supply Center  
ATTN: DDRV-TMPA, D. Gay  
Richmond, VA 23219

Commander  
ATTN: Crane Division (Code 4053)  
Naval Surface Warfare Center  
Crane, IN 47522-5000

## TEST DATA SHEET

<b>POP MARKING:</b>	
UN 1A2/Y118/S/**/USA/DOD/NAD	
**YEAR LAST PACKED OR MANUFACTURED	
<b>DATA SHEET:</b>	
Container: Mk 211 Mod 3 and Mk 567 Mod 0 Shipping and Storage Container	
Type: 1A2	Container P/N or NSN: N00197-88-C-0035
Specification Number: DL 5166851	Material: Steel
Gross Weight: 118 kg (260 pounds)	Dimensions: 20.25" W x 33.13" H
Closure (Method/Type): Cover and Locking Ring	Tare Weight: 40 kg (89 pounds)
Additional Description:	
<b>PRODUCT:</b>	
Name: See table 1	NSN(s): See table 1
United Nations Number: See table 1	
United Nations Packing Group: II	
Physical State (Solid, Liquid, or Gas): Solid	
Vapor Pressure (Liquids Only): N/A      At 50 °C: N/A      At 55 °C: N/A	
Consistency/Viscosity: N/A	Density/Specific Gravity: N/A
Amount Per Container: See table 1	Flash Point: N/A
Net Weight: See table 1	
<b>TEST PRODUCT:</b>	
Name: Warhead (Inert)	Physical State: Solid
Consistency: N/A	Density/Specific Gravity: N/A
Test Pressure (Liquids Only): N/A	
Amount Per Container: N/A	Net Weight: 77 kg (171 pounds)
Additional Description:	
The net weight includes the current maximum product weight plus an additional 13 kg (28 pounds).	

**TABLE 1**  
**Products Approved for Shipping in the**  
**Mk 211 Mod 3 Shipping and Storage Container**

NALC/ DODIC	NSN	Product Nomenclature	Packing Drawing Number	Haz Class/Div	UN Number	Units/ Cntr	Total Net Weight (lb)	Total Gross Weight (lb)
V453	1336-00-398-9993	Warhead, Mk 90/O	5166865	1.1D	0286	1	143.0	232.0
V356	1336-00-060-8797	Warhead, Mk 51/1	5166865	1.1D	0286	1	142.0	231.0
YW87	1336-01-136-7603	Warhead, Mk 115/O	5166865	1.1D	0286	1	91.0	180.0
V991	1336-01-297-7318	Warhead, Mk 115/1	5166865	1.1D	0286	1	138.0	227.0

**Mk 567 Mod 0 Shipping and Storage Container**

NALC/ DODIC	NSN	Product Nomenclature	Packing Drawing Number	Haz Class/Div	UN Number	Units/ Cntr	Total Net Weight (lb)	Total Gross Weight (lb)
ZW48	1336-00-193-5247	ANDKT 27	2644737	N/A	N/A	1	138.0	184.0
ZW33	1336-00-465-9239	ANDKT 26	2644736	N/A	N/A	1	139.0	185.0
JW58	1336-01-088-8022	ANDKT 42	2644737	N/A	N/A	1	139.0	185.0

N/A = Not Assigned